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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/637,844	08/10/2000	Nicholas L. Abbott	2307Z-085820US	7090

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EXAMINER

CELSA, BENNETT M

ART UNIT	PAPER NUMBER
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1639

DATE MAILED: 06/30/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

file copy

Office Action Summary

Application No.
09/637,844

Applicant(s)
Abbott et al.

Examiner
Bennett Celsa

Art Unit
1639



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 66-89 and 109-117 is/are pending in the application.
- 4a) Of the above, claim(s) 69-89 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 66-68 and 109-117 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 3 6) ☐ Other:

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DETAILED ACTION

Status of the Claims

Claims 66-89 and 109-117 are currently pending.

Claims 69-89 are withdrawn from consideration as being directed to a nonelected invention.

Claims 66-68 and 109-117 are under consideration.

NOTE: the location of the present application is ART UNIT 1639.

Election/Restriction

1. Applicant's election without traverse of Group I (claims 66-75 and 109-113) in Paper No.

6 is acknowledged. Accordingly, claims 76-89 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention.

2. Applicant's further election of species of :

a. Carboxylic acid (as category A “recognition moiety”);

b. Inorganic ions (as category B “analyte”); and

c. Ionic binding (as category C “interaction type”)

in Paper No. 6 and 8, which reads on claims 66-68 and 109-117 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction

requirement, the election has been treated as an election without traverse (MPEP § 818.03(a))

Accordingly, claims 69-75 are withdrawn from further consideration pursuant to 37 CFR

1.142(b) as being drawn to a nonelected invention.

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Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

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4. Claims 66-68, 109-110 and 114-115 are rejected under 35 U.S.C. 102(a) as being anticipated by Gupta et al. Science Vol. 279, (27 March 1998) pages 2077-2080.

Gupta et al teaches a liquid cell assembly comprising two separate gold filmed substrates with a mesogenic layer in between with an organic layer (e.g. SAM) comprising immobilized ligands to bind corresponding receptors (e.g provided by opening for entry of analyte) (E.g. see use of BiSH/protein; protein/antibodies; biotin/avidin as receptor/ligand interactions: e.g. ionic/covalent binding) . See e.g. Fig. 2; abstract pages 2078-2079.

5. Claims 66-68, 109-111 and 114-117 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsuda et al. US Pat. No. 6,106,906 (8/00: filed 7/95).

Matsuda et al. teaches a display apparatus comprising a liquid crystal comprising an alignment film on at least one of two opposing substrates wherein the alignment film comprises an "organic layer" comprising a "carboxylic acid" or an "organometallic" compound with displaceable ligands (e.g. a first recognition moiety") ionically interacting with an "inorganic ion" (e.g. metals: see col. 6-8) with the later formation of a "polyimide" (e.g. "polymer") which is "rubbed" prior to the addition of a "mesogenic layer"(e.g. the addition of liquid crystals). See e.g. col. 2; col 11-12; examples (especially examples 8-11; examples 29-34; and fig. 2 and col. 35-36. The reference further teaches that the alignment film comprises "an electroconductive thin film"(e.g. see col. 6) which is detected upon a threshold applied voltage (E.g see col. 22) e.g. the reference teaches an apparatus for detecting an interaction between an analyte and a recognition

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moiety"; and a "device for detecting ionic bonding between an inorganic ion and a carboxylic acid" within the scope of the presently claimed invention. Alternatively, intended use language (E.g. "for detecting an interaction between an analyte and a recognition moiety"; "device for detecting ionic bonding between an inorganic ion and a carboxylic acid") in compositions claims are not given patentable weight where the prior art product meets the material composition limitations. The reference further teaches a 1st and/or 2nd surface comprising layers of Au, 11-mercaptoundecanoic acid and 4-cyano-4-pentylbiphenyl. See e.g. Fig. 1 and 2 and page 2077 (3rd column) to page 2078 (left column).

6. Claims 66-68 and 109-110 are rejected under 35 U.S.C. 102(b) as being anticipated by DD 278869 (5/16/90) and accompanying CAPLUS AN: 1991:243888 ("Conductometric biosensor for use in organic solvent")

DD 278869 disclose a biosensor comprising:

- a. A perfluorinated ethylene-propylene copolymer membrane with 2 Pt sputtered electrodes ("5" in fig 1) which corresponds to either the 1st or 2nd substrate presently claimed;
- b. A double (PTFE) membrane ("3" and "4" in fig. 1) which corresponds to either the 2nd or 1st substrate presently claimed;
- c. A lyotropic mesogenic layer (.1-.2mm thick) in between the 1st and 2nd substrates.

The reference further teaches an "organic" (e.g. PTFE) sensory membrane (e.g. "2b") which

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is attached to the 1st and/or 2nd substrate within the scope of the present invention in which this organic sensory membrane layer "comprises" a "1st recognition moiety" (E.g. a lipase) via its intimate contact and incorporation of the liquid mesogenic layer which comprises the lipase. The reference further teaches the "interaction" via an "opening of the reference biosensor) of the "recognition moiety" (e.g. the lipase) with the "analyte" (e.g. the triglyceride) (e.g. enzyme-substrate interaction: resulting in reversible reaction at bottom of page 2 of DD 278869) .

7. Claims 66-68 and 109-110 are rejected under 35 U.S.C. 102(b) as being anticipated by Drawhorn and Abbott J. Phys. Chem. Vol. 99 (1995) pages 16511-515.

Drawhorn and Abbott teach in their Figure 1 the following: (a) two glass substrates with surfaces that are aligned such that they oppose each other, (b) a metal film (Ti) that is attached to the glass, © a film of permeable gold that coats the Ti layer, (d) the gold is 100 angstroms (i.e. 10 nanometers) thick, (e) equivalent organic layers (SAM's) that coat each of the gold film layers, (f) the SAM's have the same recognition moieties (e.g. an alkyl i.e. CH₃ or CH₃(CH₂)₁₅) or and (g) a mesogenic layer comprised either of 5CB (e.g. 4 cyano 4 pentylbiphenyl) or MBBA.

It is noted that an alkyl group meets the claimed structure (e.g. no structure is given) of a "recognition moiety" which is capable of interacting with a given analyte; or alternatively it is noted that intended use language (E.g. "for detecting an interaction between an analyte and a recognition moiety"; "interacting with an analyte"; "device for detecting ionic bonding between

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an inorganic ion and a carboxylic acid") in compositions claims are not given patentable weight where the prior art product meets the material composition limitations.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 66-68, 109-110 and 114-115 are rejected under 35 U.S.C. 103(a) as being unpatentable over Drawhorn and Abbott J. Phys. Chem. Vol. 99 (1995) pages 16511-515 and Evans et al. Faraday Discuss. Vol. 104 (1996) pages 37-48.

Drawhorn and Abbott teach in their Figure 1 the following: (a) two glass substrates with surfaces that are aligned such that they oppose each other, (b) a metal film (Ti) that is attached to the glass, © a film of permeable gold that coats the Ti layer, (d) the gold is 100 angstroms (i.e. 10

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nanometers) thick, (e) equivalent organic layers (SAM's) that coat each of the gold film layers, (f) the SAM's have the same recognition moieties (e.g. an alkyl i.e. CH₃ or CH₃(CH₂)₁₅) or and (g) a mesogenic layer comprised either of 5CB (e.g. 4 cyano 4 pentylbiphenyl) or MBBA.

It is noted that an alkyl group meets the structure of a "recognition moiety" which is capable of interacting with a given analyte; or alternatively it is noted that intended use language (E.g. "for detecting an interaction between an analyte and a recognition moiety"; "interacting with an analyte"; "device for detecting ionic bonding between an inorganic ion and a carboxylic acid") in compositions claims are not given patentable weight where the prior art product meets the material composition limitations.

The Drawhorn and Abbott reference differs from the presently claimed invention (e.g. claims 114-115) since this reference does not specify (e.g. in their Figure 1) that the recognition moiety is a carboxylic acid functional group.

However, it would have been obvious - for one of ordinary skill in the art at the time of applicant's invention to modify the device of Drawhorn and Abbott reference such that it includes the use of a carboxylic acid recognition moiety when Drawhorn and Abbott are taken in view of Evans et al.

One would have been motivated to make this substitution because Evans et al. teach in their abstract, surface modification section (page 39), and their conclusions section (page 47) the following: (a) that use of HS-(CH₂)_n-COOH organic layers on a gold-coated glass substrate is useful in liquid crystal applications, (b) that when the mesogenic layer is comprised of 5CB, use

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of COOH recognition moieties (in which "n"=15) are useful because they impart a planar anchoring surface for the liquid crystal layer, and © that "n" can be varied to any value (i.e. it could be set equal to 10 – as in the applicant's examples) in order to "fine tune" the transition between homeotropic and planar anchoring surfaces, thereby optimizing the characteristics of the liquid crystal device in question.

One would have been motivated to combine these references because they address the same technical problem: optimizing the characteristics of a liquid crystal device.

9. Claims 66-68, 109-111 and 114-115 are rejected under 35 U.S.C. 103(a) as being unpatentable over Drawhorn and Abbott (1995) and Evans et al. (1996) as applied to claims 66-68, 109-110 and 114-115 above, and further in view of Cognard, Mol. Cryst. Liq. Cryst. Vol. 1 pages 1-74(1982).

The combined reference teaching of the Drawhorn and Abbott (1995) and Evans et al. (1996) as rendering claims 66-68, 109-110 and 114-115 obvious recited above is hereby incorporated by reference in its entirety.

The combined reference teaching of the Drawhorn and Abbott (1995) and Evans et al. differs from present claim 111 which requires that the polymeric organic layer be roughened (e.g. rubbed).

However, Cognard teaches the roughening (e.g. rubbing) of polymer substrates – in conjunction with the use of organic surfactants - to optimize liquid crystal alignment.

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Accordingly, it would have been prima facie obvious to one of ordinary skill in the art at the time of applicant's invention to modify the Drawn and Abbot and Evans et al. combined reference teaching to incorporate the rubbing of the polymeric organic layer in order to optimize liquid crystal alignment.

10. Claims 66-68, 109-110 and 114-117 are rejected under 35 U.S.C. 103(a) as being unpatentable over Drawhorn and Abbott (1995) and Evans et al. (1996) as applied to claims 66-68, 109-110 and 114-115 above, and further in view of Frey et al., Anal. Chem. Vol. 68 (1996) pages 3187-3193.

The combined reference teaching of the Drawhorn and Abbott (1995) and Evans et al. (1996) as rendering claims 66-68, 109-110 and 114-115 obvious recited above is hereby incorporated by reference in its entirety.

The combined reference teaching of the Drawhorn and Abbott (1995) and Evans et al. differs from present claims 116 and 117 which requires that the use of 11-mercaptoundecanoic acid (MUA) for the formation of self assembling monolayers (e.g. SAMS).

However, the Frey et al. Reference teaches the favorable use of employing MUA for forming monolayers on gold surfaces due to its high degree of incorporation (E.g. @80%) and its ability to form amide bonds e.g. to facilitate attachment of polypeptides (E.g. polylysine) (e.g. as the "recognition moiety").

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Accordingly, it would have been prima facie obvious to one of ordinary skill in the art at the time of applicant's invention to modify the Drawn and Abbot and Evans et al. combined reference teaching to incorporate the use of 11-mercaptoundecanoic acid (MUA) for the formation of self assembling monolayers (e.g. SAMS) in view of the advantages thereof. .

11. Claims 66-68 and 109-115 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta et al. Science Vol. 279, (27 March 1998) pages 2077-2080 and Cognard, Mol. Cryst. Liq. Cryst. Vol. 1 pages 1-74(1982).

Gupta et al teaches a liquid cell assembly comprising two separate gold filmed substrates with a mesogenic layer in between with an organic layer (e.g. SAM) comprising immobilized ligands to bind corresponding receptors (e.g provided by opening for entry of analyte) (E.g. see use of BiSH/protein; protein/antibodies; biotin/avidin as receptor/ligand interactions: e.g. ionic/covalent binding) . See e.g. Fig. 2; abstract pages 2078-2079.

The Gupta et al. reference teaching differs from the presently claimed invention (e.g. claims 111-113) by failing to teach that the (bio) polymeric organic layer be roughened (e.g. rubbed).

However, Cognard teaches the roughening (e.g. rubbing) of polymer substrates – in conjunction with the use of organic surfactants - to optimize liquid crystal alignment.

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Accordingly, it would have been prima facie obvious to one of ordinary skill in the art at the time of applicant's invention to modify the Gupta et al. Reference teaching to incorporate the rubbing of the (bio) polymeric organic layer in order to optimize liquid crystal alignment.

12. Claims 66-68, 109-110 and 114-117 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta et al. Science Vol. 279, (27 March 1998) pages 2077-2080 and Frey et al., Anal. Chem. Vol. 68 (1996) pages 3187-3193.

Gupta et al teaches a liquid cell assembly comprising two separate gold filmed substrates with a mesogenic layer in between with an organic layer (e.g. SAM) comprising immobilized ligands to bind corresponding receptors (e.g provided by opening for entry of analyte) (E.g. see use of BiSH/protein; protein/antibodies; biotin/avidin as receptor/ligand interactions: e.g. ionic/covalent binding) . See e.g. Fig. 2; abstract pages 2078-2079.

The Gupta et al. reference teaching differs from the presently claimed invention (e.g. present claims 116 and 117) which requires that the use of 11-mercaptoundecanoic acid (MUA) for the formation of self assembling monolayers (e.g. SAMS).

However, the Frey et al. Reference teaches the favorable use of employing MUA for forming monolayers on gold surfaces due to its high degree of incorporation (E.g. @80%) and its ability to form amide bonds e.g. to facilitate attachment of polypeptides (E.g polylysine) (e.g. as the "recognition moiety").

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Accordingly, it would have been prima facie obvious to one of ordinary skill in the art at the time of applicant's invention to modify the Gupta et al. reference teaching to incorporate the use of 11-mercaptoundecanoic acid (MUA) for the formation of self assembling monolayers (e.g. SAMS) in view of the advantages thereof. .

General information regarding further correspondence

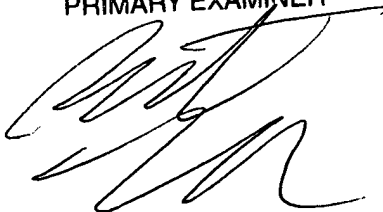
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Celsa whose telephone number is (703) 305-7556.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew J. Wang (art unit 1639), can be reached at (703)306-3217.

Any inquiry of a general nature, or relating to the status of this application, should be directed to the Group receptionist whose telephone number is (703) 308-0196.

Bennett Celsa (art unit 1639)
June 26, 2003

BENNETT CELSA
PRIMARY EXAMINER

A handwritten signature in black ink, appearing to be 'Bennett Celsa', written over the printed name and title.